

source such as the one provided in the distributor tester or a hand operated vacuum pump.

ENGINE VACUUM PRESSURE

When the vacuum diaphragm unit is operating properly and the down shift linkage is adjusted properly, all the transmission shifts (automatic and kickdown) should occur within the road speed limits given in the Ford Car Performance Specification Book.

If the shifts do not occur within limits, or the transmission slips during shift point, use the following procedure to determine whether the engine, transmission, linkage, vacuum diaphragm unit or valve body is causing the condition.

1. Using the automatic transmission tester (Fig. 5) or equivalent, attach the tachometer to the engine, and the vacuum gauge to the transmission vacuum line at the manifold vacuum port (Fig. 6).
2. Attach the pressure gauge to the control pressure outlet at the transmission (Figs. 7 and 8).

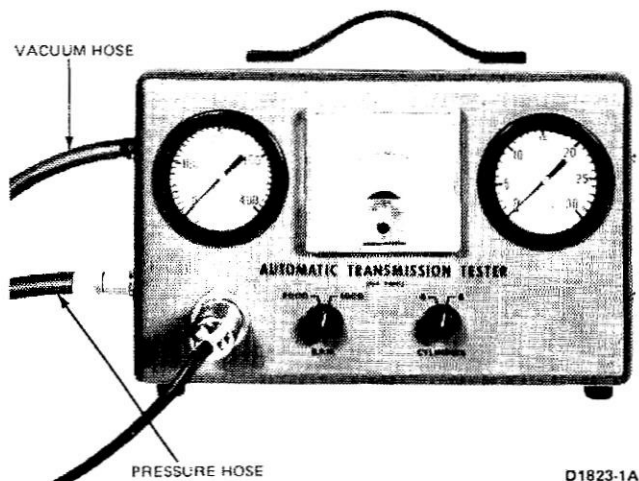


FIG. 5 Automatic Transmission Tester

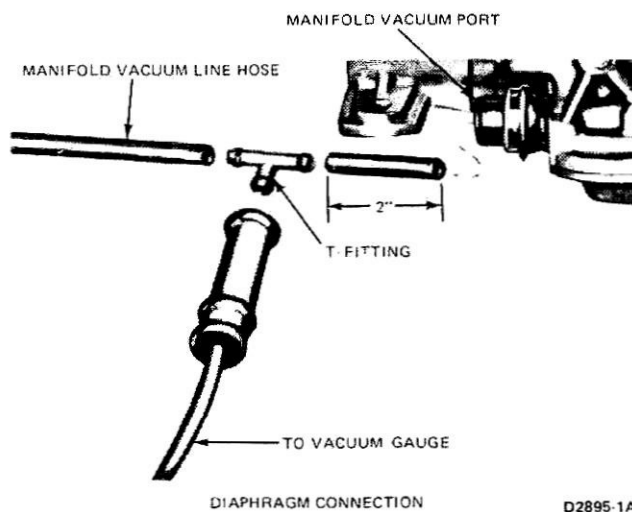


FIG. 6 Typical Vacuum Test Line Connections

3. Firmly apply the parking brake and start the engine.

On a vehicle equipped with a vacuum brake release, apply the service brakes. The parking brake cannot be used because the brake automatically releases when the transmission selector lever is moved to a drive position.

4. Adjust the engine idle speed to the specified rpm, using the carburetor idle adjustment screw. If the

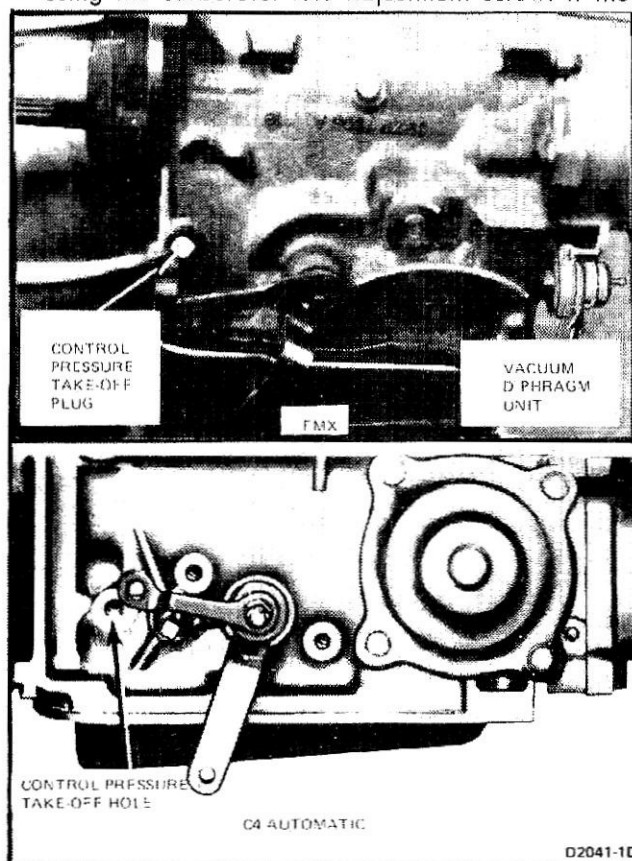


FIG. 7 Typical Vacuum Diaphragm and Control Pressure Connecting Point—C4 and FMX Transmissions

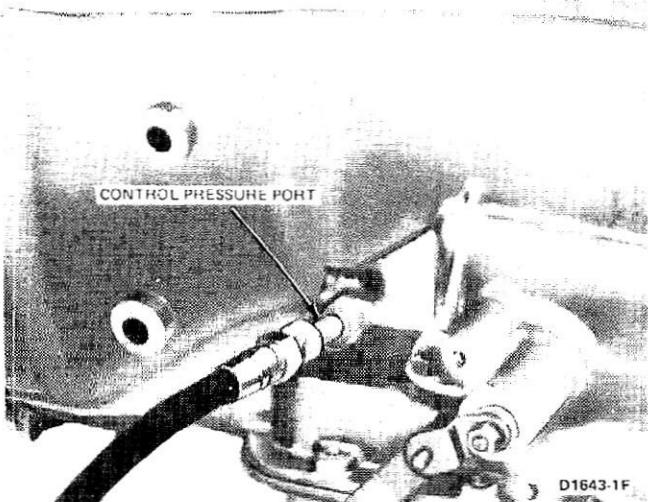


FIG. 8 Control Pressure Connecting Point—C6 Transmission

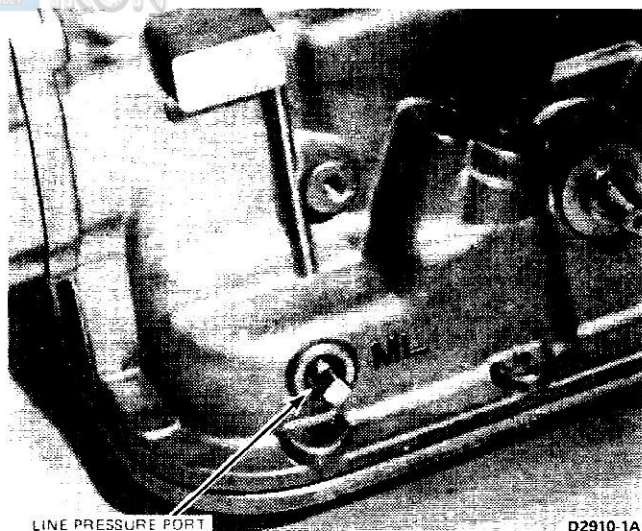


FIG. 9 Control Pressure Connecting Point—JATCO Transmission

engine idle speed cannot be brought within limits, check the throttle and downshift linkage for a binding condition. If linkage is satisfactory, check for vacuum leaks in the transmission diaphragm unit (Fig. 10) and its connecting tubes and hoses. Check all other vacuum operated units (such as the power brake) for vacuum leaks. Refer to Group 12.

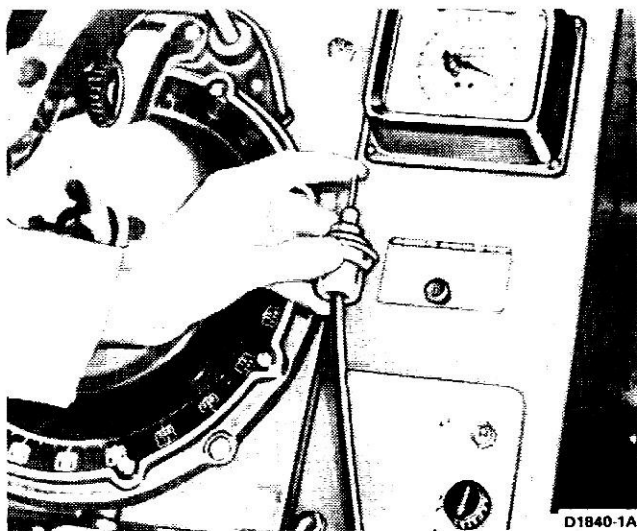


FIG. 10 Testing Transmission Vacuum Unit for Leakage

VACUUM PUMP PROCEDURE

Install the Automatic Transmission Tester. Disconnect and temporarily plug the vacuum line at vacuum diaphragm unit. Apply both the parking and service brakes. Start the engine and vacuum pump. Set the vacuum at 15 inches, read and record the control pressure in all selector positions. The two charts in Fig. 11 show what components are inoperative when the control pressure test is not within specifications. Do not proceed with the main Diagnosis Guide until you have made any repairs as required and the control pressure is within specification.

VACUUM SUPPLY TEST

The vacuum supply to the vacuum diaphragm unit and the diaphragm itself must be checked. To check the supply, disconnect the vacuum line at the diaphragm unit and connect it to a vacuum gauge. With the engine idling, the gauge must have a steady acceptable vacuum reading for the altitude at which the test is being performed. If the vacuum reading is low; check for a vacuum leak or poor engine vacuum. If the vacuum reading is okay, rapidly accelerate the engine momentarily. The vacuum reading must drop rapidly at acceleration and return immediately upon release of the accelerator. If the vacuum reading does not change or changes slowly, the transmission vacuum line is plugged, restricted or connected to a reservoir supply. Correct as required.

VACUUM DIAPHRAGM TEST—ON VEHICLE

To check the vacuum diaphragm unit, start the vacuum pump and set the regulator knob so that the vacuum gauge reads 18 inches with the end of the vacuum hose blocked off. Then connect the vacuum hose to the diaphragm unit. If the reading does not remain at 18 inches, but drops, the vacuum unit diaphragm is leaking. Replace the vacuum diaphragm unit. Also, if automatic transmission fluid is present in the vacuum side of the diaphragm or in the vacuum hose, the diaphragm is leaking and must be replaced.

VACUUM DIAPHRAGM TEST—OFF VEHICLE

To check the vacuum unit for diaphragm leakage, remove the unit from the transmission. Use a distributor tester equipped with a vacuum pump (Fig. 10). Set the regulator knob so that the vacuum gauge reads 18 inches with the end of the vacuum hose blocked off.

Connect the vacuum hose to the manifold vacuum port as shown in Fig. 9. If the gauge still reads 18 inches, the vacuum unit diaphragm is **not** leaking.

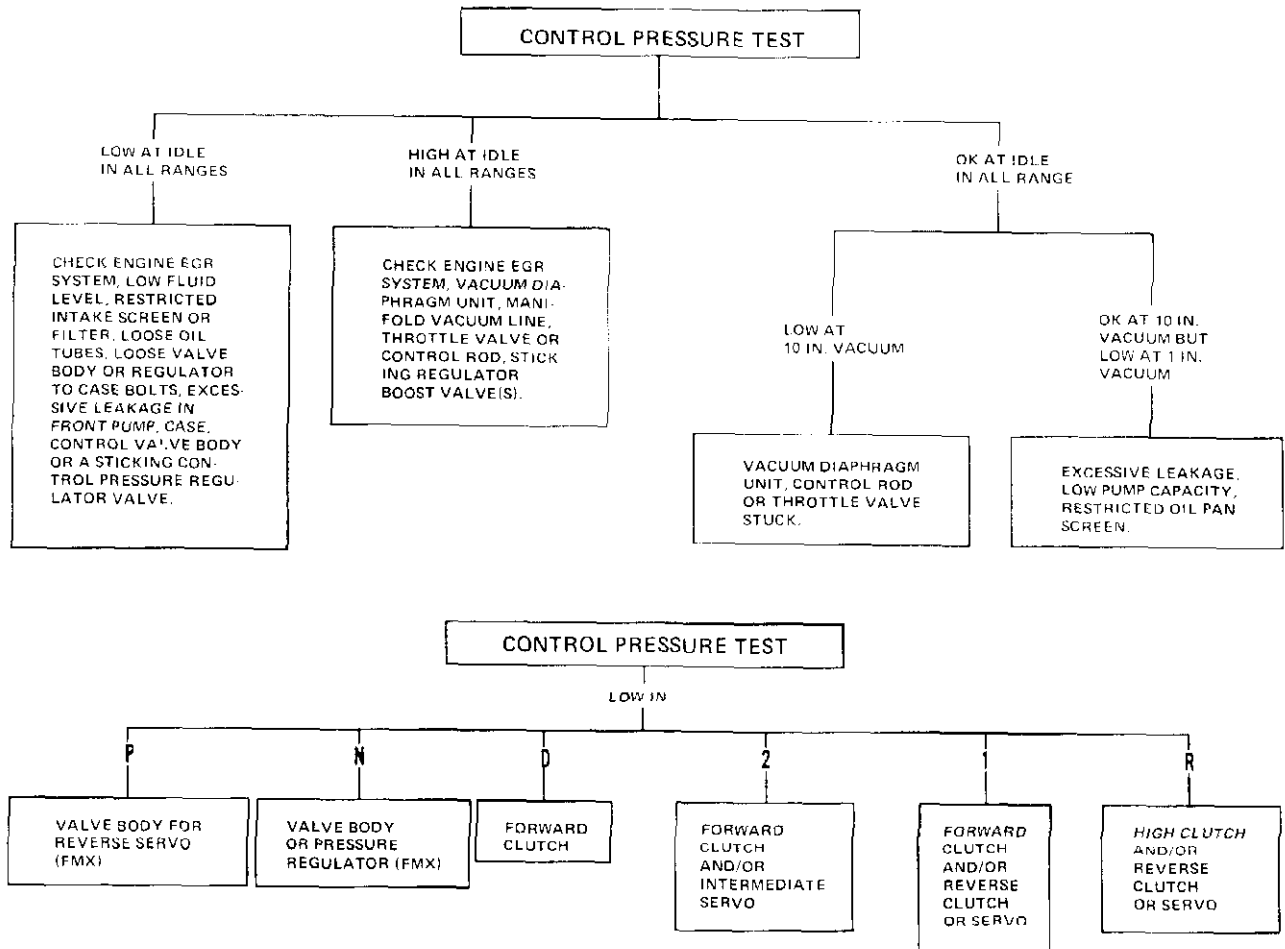
A second leakage check can be made as the hose is removed from the transmission vacuum unit. Hold a finger over the end of the control rod. When the hose is removed, the internal spring of the vacuum unit should push the control rod outward. If the vacuum diaphragm needs replacing, install a new unit that has been released for service. Vacuum diaphragm assembly identification is given in the Specifications at end of this Part.

STALL TEST (SEE FIG. 12)

Start the engine to allow it to reach its normal temperature. Apply both the parking and service brakes while making tests.

The stall test is made in D (DRIVE), 2 (SECOND), 1 (FIRST) or R (REVERSE) at full throttle to check engine performance, converter clutch operation or installation, and the holding ability of the forward clutch, reverse-high clutch and low-reverse band and the gear train one-way clutch. **While making this test, do not hold the throttle open for more than five seconds at a time.**

After test, move the selector lever to N (NEUTRAL) and run engine at 1000 rpm for about 15 seconds to



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FIG. 11 Control Pressure Test Chart

cool the converter before making the next test. If the engine speed recorded by the tachometer exceeds the maximum limits given in Specifications Book, release the accelerator immediately because clutch or band slippage is indicated.

GOVERNOR CHECK

The governor can be checked at the same time as the Control Pressure Test is performed and in the same manner.

Raise the vehicle with an axle or frame hoist so that the rear wheels are clear of the floor. Disconnect and plug the vacuum line to the vacuum diaphragm unit. Connect the line from the distributor tester to the vacuum diaphragm unit. Install the Automatic Transmission Tester.

CAUTION: NEVER EXCEED 60 MPH SPEEDOMETER SPEED.

C3, C4 and C6

Place the transmission in manual 2, no load on the engine and apply 10 inches of vacuum to the vacuum diaphragm unit. Increase the speed slowly and watch the speedometer. Check the mph at which the control

pressure cutbacks occur. It should occur between 10-20 mph.

NOTE: After each test move the selector to neutral, run the engine at 1000 rpm to cool the transmission.

Decrease the vacuum at the vacuum diaphragm to 0-2 inches. Repeat the check. Control pressure cutback should occur between 30-50 mph.

The governor is good if the cutback occurs within these specifications. If the cutback does not occur within specifications, check shift speeds to verify that it is the governor and not a stuck cutback valve, then repair or replace the governor.

FMX

With zero inches of vacuum at the vacuum diaphragm unit, place the transmission in the manual 2 and with the brakes applied, raise the engine rpm until the control pressure reaches maximum psi.

Release the brakes slowly and check the control pressure at 10 mph, and 20 mph. While there are no specifications, control pressure should be lower at 20 mph than at 10 mph.

TRANSMISSION FLUID COOLER FLOW CHECK

The linkage, fluid and control pressure must be within specifications before performing this flow check.

Remove the transmission dipstick from the filler tube. Place a funnel in the transmission filler tube. Raise the vehicle, remove the cooler return line from its fitting in the case. Attach a hose to the cooler return line and fasten the free end of the hose in the funnel installed in the filler tube.

Start the engine and set idle speed at 1000 rpm with the transmission in neutral.

Observe the fluid flow at the funnel. When the flow is "solid" (air bleeding has been completed), the flow should be liberal. If there is not a liberal flow at 1000 rpm in neutral, low pump capacity, main circuit system leakage, or cooler system restriction is indicated.

To separate transmission trouble from cooler system trouble, observe the flow at the transmission case converter-out fitting.

SHIFT POINT CHECKS—(ROAD TEST)

Check the minimum throttle upshifts in D (DRIVE). The transmission should start in first gear, shift to second, and then shift to third, within the shift points given in Ford Car Performance Specifications Book.

With transmission in third gear, depress the accelerator pedal through the detent (to the floor). The

transmission should shift from third to second or third to first, depending on vehicle speed.

Check the closed throttle down shift from third to first by coasting down from about 30 mph in third gear. The shift should occur within the limits given in the the Ford Car Performance Specifications Book.

When the selector lever is at 2 (SECOND), transmission can operate only in second gear.

With the transmission in third gear and road speed over 30 mph, the transmission should shift to second gear when the selector lever is moved from D (DRIVE), to 2 (SECOND), to 1 (FIRST). The transmission will downshift from second or third to first gear when this same manual shift is made below approximately 25 mph with a C4 transmission, 30 mph with a C6 transmission or 35 mph with an FMX transmission. **This check will determine if the governor pressure and shift control valves are functioning properly. During the shift point check operation, if the transmission does not shift within specifications, or certain gear ratios cannot be obtained, refer to the Diagnosis Guide to resolve the problem.**

SHIFT TEST (IN SHOP)

A shift test can be performed in the shop to check shift valve operation, governor circuits, shift delay pressures, throttle boost and downshift valve action.

Raise the vehicle with an axle or frame hoist so that the rear wheels are clear of the floor. Disconnect and plug the vacuum line to the vacuum diaphragm unit.

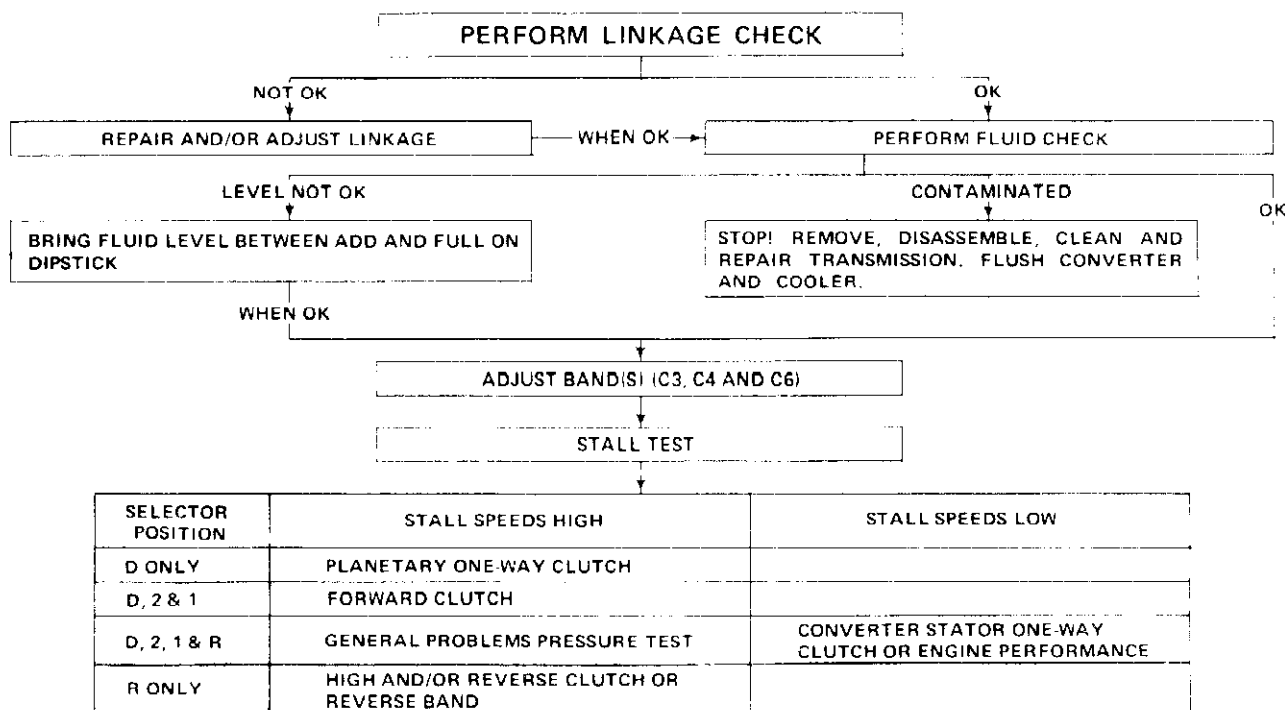


FIG. 12 Stall Test Diagnosis

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Connect the line from the distributor tester vacuum pump to the vacuum diaphragm unit.

CAUTION: NEVER EXCEED 60 MPH SPEEDOMETER SPEED

1. To check the shift valves and governor circuits, apply 18 inches of vacuum to the transmission vacuum diaphragm unit. Place the transmission in Drive and make a minimum throttle 1-2 and 2-3 shift test. At this point of shift you will see the speedometer needle make a momentary surge and feel the driveline bump. If the shift points are within specification, the 1-2 and 2-3 shift valves and governor are OK.

If the shift points are not within specification, perform a Governor Check to isolate the problem. NOTE: After each test, move the selector lever to neutral, run the engine at 1000 rpm to cool the transmission.

2. To check the shift delay pressures and throttle boost, decrease the vacuum at the vacuum diaphragm to 0-2 inches. Make a 1-2 shift test. If the shift point raises to specification, the throttle boost and shift delay systems are functioning.

NOTE: After each test, move the selector lever to neutral, run the engine at 1000 rpm to cool the transmission.

3. To check downshift valve action, leave the vacuum to the vacuum diaphragm at 0-2 inches. Position the downshift linkage in the wide open throttle position (through the detent) and repeat the 1-2 shift test. The speed at the shift point should be higher.

AIR PRESSURE CHECKS

A NO DRIVE condition can exist, even with the correct transmission fluid pressure, because of inoperative clutches or bands. Erratic shifts could be caused by a stuck governor valve. The inoperative units can be located through a series of checks by substituting air pressure for the fluid pressure to determine the location of the malfunction.

When the selector lever is at 2, a NO DRIVE condition may be caused by an inoperative forward clutch. A NO DRIVE condition at D may be caused by an inoperative forward clutch or one-way clutch. When there is no drive in 1, the difficulty could be caused by improper functioning of the forward clutch or low-reverse band and the one-way clutch. Failure to drive in reverse range could be caused by a malfunction of the reverse-high clutch or low-reverse band or clutch.

When you have a slip problem but don't know whether it's in the valve body or in the hydraulic system beyond the valve body, the air pressure tests can be very valuable.

To make the air pressure checks, loosen the oil pan bolts and lower one edge of the oil pan to drain the transmission fluid. Remove the fluid pan and the control valve body assembly. The inoperative units can be located by introducing air pressure into the transmission case passages leading to the clutches, servos and governor (Figs. 13, 14, 15, 16 and 17).

Forward Clutch (C3, C4, C6 and JATCO) or Front Clutch (FMX)

Apply air pressure to the transmission case forward clutch or front clutch passages (Figs. 13, 14, 15, 16 and 17). A dull thud can be heard when the clutch piston is applied. If no noise is heard, place the fingertips on the input shell (forward clutch cylinder—FMX) and again apply air pressure to the forward or front clutch passage. Movement of the piston can be felt as the clutch is applied.

Governor

Apply air pressure to the control pressure to governor passage, (Figs. 13, 14, 15, 16 or 17) and listen for a sharp clicking or whistling noise. The noise indicates governor valve movement.

Reverse High Clutch (C3, C4, C6 and JATCO) or Rear Clutch (FMX)

Apply air pressure to the reverse—high clutch (Figs. 13, 14, 15, 16 or 17). A dull thud indicates that the reverse—high or rear clutch piston has moved to the applied position. If no noise is heard, place the fingertips on the clutch drum and again apply air pressure to detect movement of the piston.

Intermediate Servo (C3, C4, C6 and JATCO) or Front Servo (FMX)

Hold the air nozzle in the front servo apply tube or the intermediate servo apply passages (Figs. 13, 14, 15, 16 or 17). Operation of the servo is indicated by a tightening of the front or intermediate band around the drum on C3, C4 and C6 transmission or by movement of the servo piston stem on FMX models. Continue to apply air pressure to the servo apply tube or passage, and introduce air pressure into the front release tube or the intermediate servo release pressure. The front or intermediate should release the band against the apply pressure.

Low-Reverse Servo (C3, C4) or Rear Servo (FMX)

Apply air pressure to the low-reverse or rear servo apply passage (Figs. 13, 14 or 16). On C3 and C4 transmissions, the low-reverse band should tighten around the drum if the servo is operating properly. On FMX transmissions, movement of the servo piston stem indicates correct operation.

If the servos do not operate, disassemble, clean and inspect them to locate the source of the trouble.

If air pressure applied to either of the clutch passages fails to operate a clutch or operates both clutches at once, remove and, with air pressure, check the fluid passages in the case and front pump to detect obstructions.

Low-Reverse Clutch—C6 Only

Apply air pressure to the low-reverse clutch apply passage (Fig. 15). A dull thud should be heard if the clutch is operating properly.

If the passages are clear, remove the clutch assemblies, and clean and inspect the malfunctioning clutch to locate the trouble.